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TWO RUINS RECENTLY DISCOVERED IN THE RED ROCK COUNTRY, ARIZONA¹

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Not the least important part of the great domain added to the United States fifty years ago by the treaty of Guadalupe Hidalgo was the territory of New Mexico. Early exploration in that section indicated that it was a field rich in archeological problems, and every new explorer brought back an account of its antiquities which rivaled that of his predecessors. Perhaps no subject excited more general interest than the ruins of the cliff-houses, a style of aboriginal dwelling of which little was known to a science yet in its infancy. From year to year knowledge of these unique structures became more accurate, and speculation as to their character less fanciful, as archeology became a more exact science. The novelty of a description of cliff-houses is past, startling theories concerning them are less frequent, and the scientific student finds before him a task technical and didactic—the accumulation of data which, when multiplied, may reveal important results. In this communication I aspire to add to our knowledge descriptions of two cliff-houses which have thus far escaped notice. It is not my purpose to discuss the character of the culture of cliff-house people.

The country between the Verde valley, north of Oak creek, and Flagstaff, Arizona, is wild and mountainous, a jumbled mass of red-colored rock formation flanked on the east and north by a spur of the Mogollon plateau. To cross these cliffs is im-

¹ Read before the Anthropological Society of Washington, April 21, 1896.

possible, and the road from Flagstaff south avoids them by the trail to Old Camp Verde. Along this road, especially across the malpais between Rattlesnake Tanks and Beaver Head, on a creek of the same name, one finds scanty vegetation, no water or fodder for horses, and but a limited supply of fuel for campfires. From its highest point the traveler can see stretching far to the west an area seldom designated on maps, but locally known, from the color of its cliffs, as the Red Rock country. Into that unexplored region permit me to be your guide on an archeological reconnoissance, for although now uninhabited it was once the site of a considerable population which has left ruins of uncommon size in its rugged canyons. We shall follow in our excursion the trail of an exploration which I undertook last summer on behalf of the Bureau of American Ethnology and the National Museum of the Smithsonian Institution, and shall consider two large cliff-houses which up to that time had escaped the study of the archeologist. There are certain preliminary ideas of the distribution of man in our Southwest which, when recalled, may add a zest to our study of these ruins.

The great plains of the Gila were, as is well known, the sites of many and populous pueblos in prehistoric times. The character of the culture of this region is well attested by the richly decorated objects which have been excavated from numerous ruins. Here rose a pueblo whose stately ruin is now called Casa Grande, and not far from the junction of the Gila and Salt rivers are mounds indicative of the remains of large and populous villages.

The Salt river cuts across a section of southern Arizona, which was formerly most thickly strewn with aboriginal habitations, in an east-west direction, flowing for the greater part of its course almost parallel with the Gila. Its northern tributaries, the Agua Fria, Verde, Tonto, and others, have numerous ruins along their banks. Crossing the watershed which separates their sources from the branches of the Little Colorado, we come to other evidences of former habitations. The San Francisco or Verde river is an affluent of the Salt and tributary of the Gila. It flows about due south, a constant stream of water, through a country which is in places of great aridity. The rocks which form the rim of the valley vary in character from a soft tufaceous formation, easily eroded and excavated, to lava and other hard

stones. The mouth of the river is not far from the great ruins of the Gila and Salt, and the sources of some of its tributaries are in the San Francisco mountains.

The character of many of the ruins of the Verde valley has been investigated and described by Dr Mearns, Mr Cosmos Mindeleff, and others. To add one or two more to the number of ruined villages in this region is no startling discovery. It might not be of more than passing interest save for its bearing on questions of the geographical distribution of certain prehistoric people in the Southwest. None of the Verde ruins thus far described are of the same type as those we are to consider; none have a similar geologic environment. The northern limit of known Verde valley ruins is on Oak creek and at Montezuma Well; but these, like others to the south, occur in a formation different in character of erosion from that of the Red Rocks. The abandoned houses of the cinder cones of San Francisco mountains north of Flagstaff are likewise of a different character. It is instructive to know the peculiarities, if any, of the aboriginal dwellings in the rocks between them.

In the course and direction of the rivers mentioned above lies a most interesting cause of the distribution of ruins, and when the time comes to make a faithful archeological map of the Southwest we shall find, with one or two important exceptions, that the largest ruins are found along water-courses of the great rivers of the country. In all human probability migration likewise followed these highways.

The valleys of these streams have played important parts in migrations, and may be called prehistoric pathways connecting a similar people of the north and south. In days when aborigines were obliged to follow river valleys, as Indians as well as the white man do today, the Verde valley was an important artery of migration, determining the distribution of human life in that section of the country.

An archeological map of Arizona, Colorado, and New Mexico will show not only the relationship of the geographical distribution of man to streams of water, but also the influences of geological surroundings on the peculiar character of aboriginal dwellings adopted by the same culture in different regions. In that way of looking at the question an archeological and a geological map will be found to have many coincidences, for men

of the same culture in the adobe plains build adobe houses, in tuffaceous rocks burrow troglodytic caverns, and in canyons with natural caves erect cliff-houses. The caves of the Red Rocks resemble in mode of formation those of the Mesa Verde in southern Colorado. Has that similarity led to corresponding resemblances in the architecture of cliff-houses built within them? These and many other questions impart a new interest to the two ruins we are about to consider. We have before us a detail of the effect of environment on prehistoric culture.

There is no more delightful place in the Verde valley in which to camp than among the trees fringing Oak creek, under that great buttress of rock called the Court House butte, one of the few pinnacles in the Red Rock country which is indicated on maps of the region. Near by is a ranch owned by an enterprising vinecultivist named Schürmann, from whom I learned of the existence of the Red Rock cliff-houses, which lie about ten miles northwest of his ranch. There is no road leading to them, but they are easy to find by following the line of cliffs. It is very difficult to impart any very definite information regarding geographical locality in a territory so vast and little known as some sections of Arizona, but it may give some idea of the situation of the Red Rocks if I say that a straight line drawn from Prescott, the former capital of Arizona, to Flagstaff in a northeasterly direction passes through this region in the neighborhood of these new cliff ruins, which on that line are about two-thirds the distance from the former to the latter cities. Their latitude is about 35° north and longitude 112° west from Greenwich, according to the best maps at my disposal.

I have purposely limited my consideration to the two largest ruins of this section, and have given to them the names Palatki, Red House, and Honanki, Bear House, using Tusayan nomenclature, notwithstanding the Hopi have no names known to me for these ruins. The region of the Red Rocks suggests the mythic land called Palatkwabi, or Red Land of the South, from which, according to their legends, came the Water House people, one of the most important components of the Hopi stock. We have definite knowledge, through legends, that this people once lived near Winslow, in a pueblo, Homolobi, at Sunset Crossing of the Little Colorado, and their legends state that they came from a Giant Cactus country, which may have been as far south as the Gila valley.

The rocks¹ take the form of huge pinnacles, buttes, temples, and regular structures like fortifications. When we carefully examine the sides of the cliffs in detail we find among the crevices and indentations series of defensive walls made by man for security. Most of these are inaccessible, and the wonder is how they were formerly approached by friend or foe. I can think of no better region of the Southwest with which to compare the Red Rocks than cliffs like those of the Navaho Church, often pointed out to the traveler on the railroad near Fort Wingate, and the fantastic shapes which the mountains here take rival those of the Garden of the Gods in Colorado.

This region has had a dark and bloody history in years not very long past, for it was to these inaccessible canyons that the Mohave Apaches retreated and made their last stand in the Verde. Twenty years ago no white man could have entered this country unarmed, and many sanguinary conflicts between soldiers and Indians occurred a few miles from these Red Rocks. They led to the extermination of the latter, who left few reminders of their former occupancy save charred "mescal pits," fragments of basketry, and here and there a few characteristic pictographs.

In the formation of the caves of the Red Rocks the weathering has been greatly aided by gravity. The faces of the cliffs are not honeycombed, but have sharp, hard surfaces left by the fall of fragments of the exposed rock. The greatest recent erosion seems to have been at their base, and the face of the undermined cliff has been left clear cut almost perpendicularly by the falling of huge fragments, which have accumulated a considerable talus. As a result, it is common to find the upper rim of the precipice protruding far beyond the base, forming a roof-like covering to the accumulating detritus below. By this fall of great fragments, some of which are cyclopean, great caverns are made, the walls of which are the concoidal surfaces of fracture, only indirectly due to erosion. This mode of formation of caverns in the Red Rocks is different from that of some other regions of the Verde valley, and has profoundly affected the character of aboriginal dwellings in this region.

The first ruin of which I shall speak is Palatki, which lies in

¹ No geologist has yet visited the country in which these ruins are situated. They are supposed by some to belong to the Jura-Trias, by others to the Carboniferous formations.

a well wooded canyon near a prominent butte a few miles west of Indian Garden. Our first camp in the Red Rocks was made at the foot of the talus upon which it stands, in a clump of scrub oaks. A prime necessity of a camp is, of course, water, but of this there was none near the ruin at the season when we visited it. There is, however, little doubt that when the Red Rocks were inhabited many springs, now unknown, furnished an ample supply. It is hardly necessary to suppose that there has been any considerable diminution of the rainfall since that time, and in other months the country is better watered.

The foundations of Palatki rest on the top of a talus of fallen debris, which has been considerably augmented by the overturning of some of the walls of the ruin. The whole building is plastered to the side of the cliff, and when seen from the plain reminds one of a swallow's nest perched above the trees. The entrance to the rooms from the outside is easy, the trail following the decline of the fallen walls.

I believe from the general appearance of the ruin that it had been rarely, if ever, visited by white men before us, and certainly no archeologist has described it in print. No names or initials were seen scribbled on its walls, and objects of archeological interest were picked up from the accumulated debris above the floor. The precipice rises about fifty feet behind it and arches over the ruin, forming a roof, protecting it from falling rain.

A marked architectural feature which one could readily see in a ground plan is a series of bow-shape curves in the front wall. The object of these curves was probably to secure greater space for the rooms, and possibly to strengthen the walls by horizontal arches. The altitude of the front wall at its highest point was about thirty feet, and there are evidences of the former existence of three tiers of rooms, one above the other. The external walls of the ground floor were built of large, roughly hewn stones, covered with adobe on the outer faces. This is a feature of cliff-ruin masonry as far north as the San Juan and Mancos canyons, where it has been commented on by Nordenskiöld.

High above the upper edge of the walls two circular figures were noticed on the face of the cliff. These were made with white chalk, and, as they are estimated as twenty feet above the upper edge of the front wall, would seem to indicate that the roof was formed somewhat higher than the standing walls now indicate.

I need not say that these drawings are pictographs, but they were probably not made by the original accolents of Palatki, for in style of painting and symbol depicted they resemble the work of the Mohave Apache. This vigorous nomad people no doubt camped in the ruin of Palatki after it was deserted by its builders, and to them may be traced the many signs of destruction visible both within and without.

Square openings are observable above the entrance, which is situated in the middle of the front wall on a level with the foundation, and the former passageway closed by a wall of masonry. Crawling into the house through the opening, one finds it divided into several compartments, indicated by fragments of vigas and flooring, all of which have been charred by fire. The inner surface of the walls was smoothly plastered, as if left a few days ago, and the floor was littered with debris, fragments of agave leaves, basketware, and broken pottery. The offensive alkaline dust, dry as tinder, readily yields to the spade, but causes great inconvenience to workmen, who were repeatedly obliged to cease digging in it on account of this fact. Excavation revealed fragments of cloth made of agave fiber and cotton, fallen beams, and broken pottery of the rough kind. There were many flakes of obsidian, stone implements and spear-points, fragments of pigments, kaolin, and a few marine shells.

A systematic description of the collection made from this ruin will be published elsewhere.

A view of Palatki from the west end reveals the interior of one of the rooms and a detached front wall standing isolated from the cliff. Huge bowlders are here utilized for foundations, but these fragments of the cliff had of course fallen to their present position before the structure was erected. Occasionally similar large bowlders occur within the inclosure of the walls, evidently detached since the ruin was deserted. Palatki has suffered sorely at the hands of Apaches, who have wrenched many of the beams from the walls for firewood and overthrown sections of the front wall. As a rule, the southwestern ruins are now suffering more from the white man than from the Indian. If this destruction of the cliff-houses of New Mexico, Colorado, and Arizona goes on at the same rate in the next fifty years that it has in the past, these unique dwellings will be practically destroyed, and unless laws are enacted, either by states or by the general govern-

ment, for their protection, at the close of the twentieth century many of the most interesting monuments of the prehistoric peoples of our Southwest will be little more than mounds of debris at the bases of the cliffs. A commercial spirit is leading to careless excavations for objects to sell, and walls are ruthlessly overthrown, buildings torn down in hope of a few dollars' gain. The proper designation of the way our antiquities are treated is vandalism. Students who follow us, when these cliff-houses have all disappeared and their instructive objects scattered by greed of traders, will wonder at our indifference and designate our negligence by its proper name. It would be wise legislation to prevent this vandalism as much as possible and good science to put all excavation of ruins in trained hands. In this particular we have much to learn from the European method of control of the antiquities of the country by proper authorities or societies for the protection of historical monuments.

The parts of the cliff-houses were not continuous, but the town was separated into two portions by a projecting buttress of rock. About a hundred yards to the west of the section described, in a cave with overhanging roof, we found a second group of houses, which evidently formed a part of the same cliff pueblo. Its protected position made it a more remunerative ruin for excavation, and from it were obtained many most interesting relics of the former builders. Excavations likewise revealed the general character of the masonry, particularly the line of the floor or roof of a chamber, the walls of which had fallen. In the inner rooms of this portion of Palatki we dug up several good fragments of cotton cloth, much basketry and pottery, with nets made of agave fiber. The accumulated debris on the floor was found on removal to cover a fireplace in the middle of the room and a stone box used for grinding meal. There were also many corn cobs and grains of maize, the latter regarded as indicative of the food of former inhabitants. This portion of the ruin, like the former, was originally three stories high, and contained at least fifteen rooms, ranging in size from four to twenty feet in dimensions. While it is very difficult to estimate the former population by the number of rooms, a conservative guess would lead me to suspect that the two sections together may have housed one phratry. Granting this as probable, we find that the two largest phratries of Walpi have sixty-eight and fifty-

seven members respectively. At present, however, neither of these occupy the number of rooms there were in Palatki. As an approximation, I suggest that this cliff-house had one hundred inhabitants when peopled, which would allow six persons to a room. While this estimate would appear to indicate that the rooms were rather crowded, I know a family at Walpi of eight persons, a mother and two married daughters and three children, who occupy a room not larger than several at Palatki. It may be mentioned, however, that they have a second room for a granary, which was too dark and full of spiders to be visited with comfort. The former census of Palatki, on a basis of modern pueblo life, was not far from one hundred human beings.

About four miles west of Palatki is a small cliff-house, Honanki, the largest of those discovered by me in the Red Rocks. While it differs somewhat from Palatki, the resemblances are so close that it is referred to related people. It would seem that Palatki was the home of related clans of small size. Honanki, on the contrary, was a large pueblo comparable in size with Walpi. Its population was counted by hundreds, and it is by far the largest cliff-house yet reported from the Verde valley. Honanki was not, however, a compact village, but stretched along the face of the precipitous cliff for over an eighth of a mile. It is easy of access and can readily be entered from many points.

As one approaches the ruin he enters it through a passageway situated about midway in its length, where there is a vista along the front wall of a number of rooms beginning with a high round tower at the eastern end. When we pass abreast of this tower the height of the ruin at that point is more apparent. It is protected by an overarching cliff, and is mounted on a shelf of rock ten feet high.

The front section of the ruin looking in an opposite direction shows it to be about five hundred feet long, or not more than an eighth of the total length. To obtain a view of the whole ruin of Honanki at one glance was quite impossible, for it is partially hidden by a grove of trees from the plain below, and views along the front are obstructed by projecting buttresses of the cliff.

The tower of Honanki has windows and small peep-holes. The exterior wall of this part was not broken by an entrance, and from its top one could obtain a wide view over the neighboring tree tops.

Entering the section of Honanki which has been described, we find it divided into a series of inclosures communicating with each other from one end to the other. The nicely plastered walls still show the soot of former fires, while in several of the chambers the beams are still in place. This part of Honanki was three stories high, as shown by the evidence of flooring. The vertical cliff which formed the back of the rooms was in several places covered with soot and scored with pictographs. From that portion of Honanki which has been described the ruin extends along the cliff for an eighth of a mile and consists of a series of rooms plastered to the face of the precipice. The front wall of this row of chambers has fallen, and although the lateral walls are in place they are much dilapidated. The appearance indicates that there were two tiers of rooms, and that in places there were two parallel rows. It is not rare to find small granaries back of these rooms, separated from them by a rear wall of the chamber.

The excavations in the floor of these rooms of Honanki were more thorough than at Palatki, and revealed a number of objects of interest to the archeologist. Here was found a fine board identical with that still used by the Tusayan Indians in kindling fire on certain ceremonial occasions. A small reed within which was a wad of cotton somewhat charred was likewise found near a fireplace. The general form of this implement led me to suspect that it was a slow-match to conserve fire after it had been kindled by primitive methods. There were many specimens of sandals made of yucca fiber, cloth of cotton and agave, netting, and open-mesh woven cloth identical in pattern with leggings worn by a supernatural personification who performs a striking role in certain ceremonial performances at Tusayan today.

Of more than usual interest was a stone implement cemented with pitch into a wooden handle, a kind of instrument thus far not reported from other cliff-houses. To enumerate the different kinds of pottery obtained in our shallow excavations would take me into a too technical discussion of the small collection, but it may be mentioned that all the various forms of coiled ware, with fragments of black and white and red decorated vessels, were well represented. In all instances the decorations of the smooth varieties was in geometrical patterns.

In the complication of figures depicted upon it, the cliff-house pottery, of which Nordenskiöld has published a series from the Mancos canyon, does not equal that of certain prehistoric ruins of Tusayan, but indicates an undeveloped artistic taste. Geometric patterns predominate and highly specialized symbolic adornment is exceptional. The archaic black-and-white ware, which seems to be characteristic of cliff-houses, was not common, a fact which may have been due to the superficiality of my excavations.

The character of the culture of the people who once peopled the cliff-houses of the Red Rocks, as indicated by the objects found in their rooms, will be discussed in a monograph devoted to that subject.

Many beams, fragments of flooring, or roofing were found buried in the floor under the dust and ashes or still projecting from the walls. These tell an interesting story. Some of the logs were six or eight inches in diameter, but not a single specimen showed the marks of a metal implement. They had evidently been gnawed off to the required length with stone hatchets, aided no doubt by the live embers. Although acquainted only with these rude methods of cutting wood, the builders of Honanki in this way made boards for lintels, still in place in some of the windows. The labor of felling the trees and smoothing logs with stone implements must have been considerable.

The ruin of Honanki may have contained two hundred rooms, and its former population, by a conservative estimate, was not far from between three and four hundred people. This would give us a population double the size of Walpi today, and there can hardly be a doubt that Honanki housed more than one phratry.

High above the extreme west end of the houses there is perched a walled-up crypt, which is without external opening and inaccessible. Repeated attempts to approach this cyst were fruitless, and there is little doubt from its general appearance that it is a burial place similar to those found in the neighborhood of other cliff-houses of the Verde region. It probably will be found to contain a desiccated human body. Directly beneath it, on the top of the talus at the foundation of the ruin, was an ash heap, from which charred bones and fragments of pottery were taken.

The position of this ash heap and the objects found in it recall the places of burial so well described and figured by Norden-skiöld in his excellent memoir on the cliff-dwellers of the Mesa Verde.

There is no doubt but that the Red Rocks contain many other cliff-houses as large or possibly larger than those which I have described. Reports of the existence of these ruins are current among cowboys and prospectors, and an exploring expedition into this field would no doubt be rewarded with interesting discoveries. Only within a few months Mr McCarty, of Flagstaff, reports another large ruin in this vicinity, and out of one of the burial cysts he took a mummy, near which were fragments of pottery and stone implements. The occurrence of similar cysts is not uncommon in the Verde ruins, but is not confined to them. The theory, however, that they were chambers where human beings were immured alive as sacrificial offerings needs more conclusive evidence than has yet been adduced. While there are legends that would seem to indicate vicarious atonement by human sacrifice among prehistoric pueblo people, it is not necessary to resort to this explanation to account for the mummies found in special walled-up rooms of cliff-houses, for, like so many other theories thrown off by the imagination to create a sensation or startle the unwary, this explanation of mummies in closed cysts rests on little evidence that will bear scientific scrutiny.

We have practically no historic data bearing on the age of the two ruins of the Red Rocks. No mention is made of the dwellings in the Verde valley in early documents, and it is probable that, had they been inhabited in 1540, Coronado would have attempted to reach them in his memorable expedition. The trail which he took for Cibola, after leaving Chichilticalli, was doubtless more to the east, and he no doubt followed a well-known trail used by natives in their visits. As he entered an uninhabited region after leaving the Sobaipuri, we may rightly suspect that the river valleys along the northern branches of the Salt had been abandoned before his advent. If so, we may conclude that the same was true of the houses on the Verde, for while he and his followers were eager for the famed cities of Cibola, they would naturally not plunge into a desert if an inhabited valley took them but little from their route. While it is not certain

that the Verde valley was not inhabited¹ in the middle of the sixteenth century, and possible that sedentary people may have drifted into the valley subsequently, it would appear that both these conclusions are not tenable. There is a world of possibility in regard to the antiquity of these houses, but as yet little reliable data for trustworthy conclusions. The Red Rock cliff-houses may have antedated Columbus or they may not be older than the sixteenth century and the advent of the Apaches.

It is instructive to compare architectural features of these ruins with other types taken from more southern parts of the Verde valley. In this comparison we find differences correlated with the character of the rocks in or near which they occur.

The small houses of Montezuma Well are isolated rooms built in horizontal crevices in the sides of a circular basin within which is a large spring. This extraordinary crater-like depression is not due to volcanic agencies, but to erosion—action of water. The adaptation of the houses at this place to the peculiar conditions is instructive. The inaccessible position chosen by the people who lived in these dwellings could not have been due to a desire for a horticultural outlook, for evidently they had no view of cultivated fields; nor, indeed, can we explain their position on a theory of defense. The ruins on the rim of the well are better situated for both these purposes. That cliff-houses were sometimes erected for horticultural outlooks is possible, but there is a probability that this theory is not broad enough in its application. In this connection may be mentioned certain fortified hilltops which are abundant in the neighborhood of the Red Rocks. One of the best examples of this type is a fortification crowning the summit of a mesa near Schürmann's ranch on Oak creek. This mesa is an almost perfect frustum with the whole top, which is level, surrounded by a wall at its edge. The ascent is impossible save at one point, where the trail is defended by a circular bastion. There are few ground plans of houses in the fortified inclosure and scanty evidences of continued occupancy. I believe that these structures are fortified retreats comparable

¹ The fact that Coronado took a route east of the Verde to reach Cibola would seem to indicate that he followed an old trail known to his guides and that it was the customary route to that province. Had he sought Tusayan, a nearer trail would have been through the Verde or Tonto basin. Doubtless he did not get definite knowledge of Moki until after he reached Zuni, although he learned of "Totontec" while in the vicinity of southern Arizona.

with the trincheras, in Sonora and the Sierra Madre of Chihuahua, described by Bandelier, or those of the Magdalena valley of Sonora investigated last winter by McGee. In the Verde valley it would appear that they were built contemporaneously with the cliff-houses or the ruins of the plains. Similar fortified hilltops are common in the mountains of Arizona. Of the several true cliff-houses in the Verde valley which have been described, I have chosen for comparison the best known, called Casa Montezuma. It needs little examination of this ruin to show that in details it differs considerably from Palatki or Honanki, although in general character it is identical with the two Red Rock cliff-houses. Whence came that difference? The rock is unlike and the cavern in which it is built is of a different geological character. If we study its architecture we should find it combined the features of a cliff-house and an excavated or cavate dwelling. The cliff-dweller had here an entirely different problem to deal with from that which he had in the Red Rocks. In the latter locality the surface of the cliff was hard, resisting excavations, and he built to the surface of a precipice, under a projecting roof, plastering his house to a perpendicular surface. At Casa Montezuma he burrowed out and enlarged a cave, which he filled in with masonry. The ruin is thus deeply sunken in a cave at Casa Montezuma, but at Palatki it stands out in relief with bow-shape front walls. There can be little doubt but that the people who built Palatki and those who made Casa Montezuma were akin, and that the architectural instinct was the same in both, and yet the difference of geological environment led to noticeable differences in construction of their dwellings. Let us take a type for study from far down the Verde on the Salt river, where the same architectural intent is again modified, but still preserved as far as possible. The cave is utilized as before, but it is situated not in the pumice-like rock of Casa Montezuma nor the hard Red Rock which repels excavation. Here we have a cavern filled with a rectangular building, the masonry of which resembles that of the neighboring plains, where adobe formed the building material. The home-maker here again adopted the material at hand. His work was directly modified by his geological environment, but there is no evidence that the character of the culture has changed.

I cannot leave this subject of the modification of pueblo hab-

itations in the Verde valley without calling attention to a type of aboriginal dwellings different from those we have already considered in this region, but duplicated in other habitats of the pueblo culture wherever conditions permit. I refer to the so-called cavate habitations, nowhere better represented than lower down on the Verde near Squaw mountain.

The builders here found the rock of such a nature as to be readily dug out into caves, but the character of the objects found in the spacious chambers within the caves shows that the excavators were similar in culture to the masons of the cliff-builders of the Red Rocks. Midway between these simpler cavate dwellings and such houses as Casa Montezuma are similar cavern habitations on Oak creek where masonry plays an intermediate part in the character of the habitations.

The only paleography of the cliff peoples of the Red Rocks which may be mentioned at this time are the petrographs, of which there are many both on the walls of the ruin and the adjacent cliffs. Two distinct kinds are recognized—those of the cliff people and those of the Apaches who succeeded them—the signatures of a few white cowboys not being considered. These aboriginal petrographs of two linguistic stocks differ in objects represented and manner of production, for the cliff-dweller pictography is ordinarily pecked into the rock, while that of the Apache is painted on its surface. There is a remarkable similarity between the pictography of this region and the older paleography of the whole pueblo region; in fact, we might extend our comparisons far outside the pueblo area. These resemblances may mean much or little, but of all the treacherous quicksands which have fascinated archeologists similarities of rude symbols is one of the worst. Although the well-known totems of many of the pueblo clans occur on the Red Rocks, our knowledge of southwestern pictography is as yet too fragmentary to justify speculations in regard to the meaning of certain common forms or designs.

The close similarity of culture which is indicated by the similarity of the ruins throughout the Verde valley is not confined to this region. The cliff-house type occurs likewise in the tributaries of the Colorado, the well-known cliff-dwellings of the San Juan and its tributaries. It is a type which seems to be peculiar to the Pacific watershed and is significantly absent along

the Atlantic or Rio Grande. The existence of other similarities of culture, however, between the cavate dwellings of the neighborhood of Shufinné on the Rio Grande and those of the Verde, Salt, and Gila rivers would seem to explain this absence as resulting from environment. The plains of the Rio Grande furnish adobe, which constitute the building material, and have not presented the requisite conditions for the phase of pueblo culture which made him a cliff-dweller.

The lesson taught by the two cliff-houses of the Red Rocks, although drawn from a limited area, is wide in its application. We have seen how great a variation there may be in the outward appearance of habitations built in the cliffs of a valley extending over barely two degrees of latitude. No one doubts for a moment that the people who built these various kinds of buildings were in comparatively the same stage of culture, and if we interrogate the objects found within the rooms we find that they indicate the same thing. Whence came these differences in the details of house-building? They are, I believe, simply the result of surroundings, and can be directly traced to the geological formations with which the builders had to deal in different parts of the valley. The makers of these houses not only were obliged to use the material at hand, since transportation of building stone was beyond their powers, but they also adapted the style of their building to the possibilities of their surroundings. In the tufaceous rocks the builder abandoned masonry and burrowed cavate chambers. This habit he combined with walls in the well-known Casa Montezuma on Beaver creek. When, however, he found himself surrounded by harder rocks of the Red Cliffs he relied wholly on masonry, building to the face of the cliffs to produce the characteristic buildings of the Verde region. In the Verde valley he likewise built stone houses in the plain and on the mesa tops, using the stone at hand. Whether, when the stone failed, he utilized adobe we do not know, but there is every reason to believe he did if necessity presented itself.

From these statements it would appear unsound to rely upon the character of buildings as a criterion of the culture of their inhabitants, and absurd to separate the habitants of cave-dwellings from those of cliff-houses. The small valley of the Rio Verde illustrates rather the great influence which natural surroundings have exerted on man as a builder in his early evolution.

The Verde valley is but a small section of a large area, the pueblo region, over which there is evidence that the prehistoric culture was uniform. If environment has led in this limited section to modifications in the style of building it ought to have similar effect in different sections. The same emergencies ought to be met in the same manner by men of the same culture, and we find that it is so met. The different kinds of building in the Verde reoccur in places geographically remote from this valley where conditions are similar. We find, for instance, cavate habitations homologous to those of the Verde in the soft rocks of the Rio Grande, and cliff-houses similar to those of the Red Rocks occur in the canyons of the tributaries of the San Juan.

One result to which my conclusions point is that an older view often entertained, that cliff-houses antedate other kinds of prehistoric dwellings in our Southwest, is not necessarily true. Recognizing the fact that the pueblo culture today is a survivor of an old culture, there seems no good reason to believe that in the ancient time it was limited to cliff-houses. It is, however, I believe, unprofitable to discuss the question whether the ancient cliff-house people were ancestors of any one of the Pueblos to the exclusion of others. We may find them closely related to Hopis or Zuñis, which is true so far as it goes, but a limitation to either is not broad enough to embrace the whole problem. The cliff-houses were specially adaptive dwellings, which have resulted from the influence of environment on a widespread culture, of which both Zuñis and Hopis are survivors. The ancestors of both, no doubt, were cliff-dwellers, for both are differentiations of a common substratum of culture. The nearest approach to that ancient form of culture at the present day is, I believe, to be found in Tusayan, the most primitive, but traces of it exist in greater or less degree accordingly as modern pueblo life is affected by outside or foreign influence, which occurs throughout the whole pueblo area and in the mountains of the northern states of Mexico.

While in a general way it is true that the Pueblos are related to the cliff-dwellers—were in fact in ancient days cliff-house people—their present consanguinity, language, customs, and beliefs have been modified by foreign blood. The competition for supremacy between the branches of the American race in the pueblo area, as has been so often the case in other lands, has

led to a compromise by admixture. The Tusayan Indian is no exception to the other Pueblos; he is no more a nomad whose ancestors adopted a sedentary life than are the cliff-dwellers, but a child of the union of many peoples of widely different modes of life.

The question of the kinship of the former sedentary peoples of the Red Rocks is of course intimately connected with that of the other prehistoric inhabitants of the Verde valley. At one extremity this line of ruins lies in the neighborhood of the Gila ruined towns, at the other the abandoned villages of the foothills of the San Francisco mountains. Until we can definitely know more of the kinship of the prehistoric peoples at each end of the series, it is perhaps futile to give much time to comparisons with either one of two unknowns. Fortunately, however, there are a few facts to be brought forward in regard to Casa Grande, one of the most prominent of the Gila ruins, and certain Tusayan legends, which appear to indicate that some of the Tusayan people formerly lived in the neighborhood of the San Francisco mountains. In a direct line south from these hypothetical habitations of the Hopi in early times to Casa Grande lies the valley of the Verde, along which are the ruins referred to. If we can show connection at both ends of a line of habitations, what inference can we draw in regard to intermediaries? It is claimed by the modern Pimas that their ancestors built Casa Grande, or rather that it was the work of a mythic person called Civano, the father of a culture-hero, Civo. The ruin in Piman language is called Civano-ki, the house (pueblo) of Civo's father. Civo in Piman folklore was reputed to have killed a monster bird which had sorely troubled his people and carried off their wives to a home in the sky. Turning now to Tusayan folklore, we likewise have a similar culture-hero called Tiyo, the phonetic resemblance of whose name to Civo is striking. He is reputed to have slain a monster eagle of the sky, who likewise carried off Hopi women. The similarity in name and incidents is suggestive. Probing deeper in these coincidences, we find the word for father in Hopi is *na*. Tiyona, with this suffix in Hopi, is Tiyo's father, a word not very distant from Civano. But there is one more element in the Piman name of Casa Grande; the word for house or pueblo is *ki* in Hopi as well as Piman. The Piman name for this interesting ruin of the Gila is practically the Hopi and has

a like meaning. The fact which I would extract from this word equation may be interesting, and for that purpose I turn to Tusayan mythology. The heroic Tiyo was the offspring of no less a personage than the solar deity, a parthenogetic child of a maid who appears in story as an earth-goddess. Civo in Piman lore was likewise miraculously born, and by analogy I suspect his father, like Tiyo's, was the sun. Casa Grande, if I am not mistaken, was the House of the Sun by Piman word-analysis and Hopi mythology. It is interesting, in view of this hypothesis, to remember that in 1697 Father Sedelmair wrote that the Pimas told him that the "sovereign" of the builders of Casa Grande looked at the sun as it rose and set through round openings in one of the rooms. One of these lookouts still remains in the west wall of the north chamber of that ruin. The statements of the Pimas in 1697 no less than the name, as interpreted by Hopi linguistics, connect this building with sun worship.

There are many similarities between Piman and Hopi words which point to relations between these people, and legends among both connect the Hopi with the ruins of the Gila. There is a group of Tusayan people who claim to have lived in the far south, and we have the Verde valley, with continuous evidences of population, almost in a direct line of migration. Is it too much to suppose a connection between the two?

The Pimas, however, declare that the former inhabitants of the Verde valley were hostile to them, implying, according to some writers, a different stock. I would not so interpret the premise, for we know that people of the same pueblo province, as those of Awatobi and Walpi in Tusayan, were enemies, and that the former village was destroyed by the latter at the close of the year 1700.

There is a bit of archeological evidence which is interesting in connection with the supposed relation between the ruins of the Gila valley and those of Tusayan. One of the marked peculiarities of the stone implements from the Gila ruins is the perfection of the polished stone celts. Among a people who live on sandy plains a stone implement means more and is, as a rule, better polished than in a rocky country, where stones are abundant. The celts found near Casa Grande and the ruins near Tempe are of finest polish, and can readily be distinguished from those made at Tusayan. The rock is different, the workmanship

superior. Among the many stone implements which I have found at Awatobi, in Tusayan, there were two stone hatchets made of a kind of rock not found in that region, but identical with those from mounds near Tempe. I believe that the existence of these in Tusayan shows that they have traveled, either by barter or in the hands of migratory bands, from the Gila to Moki. While this conclusion is hypothetical, it is probable, for there is no doubt that Pacific coast marine shells have traveled into Tusayan over a much greater distance.

The legendary history of the Hopi, as of many other Indians, is at best vague, but I was much impressed, in speaking to one of the best traditionists of the Water House people in Sitcomovi concerning Montezuma Well, to learn that he knew considerable lore which might be connected with that remarkable crater-like spring, and that his people in their northern migration once lived there. He declared that this place was not unlike one of the reputed homes of the great plumed snake, and described to me the way he had been told the water boiled from the spring into the neighboring creek. While information of this kind can hardly be dignified by the name of science, it is certainly remarkable when taken in connection with other data pointing to the migration of peoples through the Verde valley to join the Hopi.

From many considerations of a comparative nature it is probable that man early in his culture development sought caves for shelter before erecting buildings of masonry, and from that early architecture naturally developed walled dwellings. That this sequence holds in many lands there can hardly be a doubt, but that it is of universal application is improbable. It is unnecessary to regard this order of development a universal law, and by no means certain that other ways of development of house-builders were not true. Cave dwellings do not always antedate walled houses, and we often find civilized people reverting to caves for houses. You can see, for instance, the Spanish gypsies of Granada dwelling in caves today in sight of the Alhambra, and yet there is no evidence that this manner of life is a survival among these people. It is probable that it is a reversionary stage, but more likely a specially adaptive condition. In a similar way we may interpret cavate dwellings, cliff-houses, and like habitations in our Southwest. Instead of regarding cliff-houses

as a first stage in the evolution of pueblo architecture, we may consider them no older in time or development than the villages of the plains. For aught we know, the pueblo people may have lived in brush houses or skin tipis before they built stone dwellings.

The one important general conclusion to which I am led by a study of the two cliff-houses of the Red Rocks may strike the reader as trite, but its recognition in all its bearings is of fundamental importance in researches on ruins of the Southwest. Briefly stated, it is as follows: Differences in habitations are not indicative of culture stages, but are due to surroundings, to emergencies. There are instances which might be quoted where the building instinct has been so much discouraged by misfortunes that the same people who once erected stone buildings of size are represented today by descendants living in brush houses or temporary dwellings of rudest construction.

But this influence of surroundings must not be called upon to account for too much. The uniformity of pueblo culture is in part due to unity of origin, contact, and derivation. Although fully recognizing that certain similarities may be developed in human culture by acculturation, there is a limit to the theory of independent origin which has been overstepped by some of the advocates of this hypothesis. A vigorous protest against wild theories of kinship based without discrimination on points of resemblance is well made, but to ascribe all similarities to independent origin, to smother the comparative method entirely on account of its abuse in some quarters, is equally fallacious. The culture of the pueblos from the Rio Grande to Tusayan, from the San Juan to the Gila, ancient and modern, is uniform, notwithstanding intrusion of foreign blood, not because similar environment has led independently to a similarity in different regions, but from unity of origin, migrations, contact, intermarriage, and assimilation. The distinctive elements of that culture have too many resemblances in detail to have originated independently, even if we overlook contact resulting from migration, wars, barter, and intermarriage.